

# Filling up could cost less thanks to biomolecular engineering breakthrough

August 1 2014, by David Goddard

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Sticker shock at the gas pump could soon be a thing of the past thanks to research being conducted by UT and Oak Ridge National Laboratory.

Among the key components in processing fuels, particularly bio-friendly ones, are the membranes that aid in the process of separating unwanted substances such as water from the fuel.

"We can help wallets and help profits at the same time," said Michael Hu, a joint faculty member of the College of Engineering's Department of Chemical and Biomolecular Engineering and ORNL. "If we can improve that separation process it will mean a reduction in cost to make, a reduction in cost to supply, and a reduction in cost to buy."

The breakthrough technology being brought to life by the research team combines nanotextured pores with superhydrophobic or superhydrophilic—or, in plain terms, super water-repulsing and water-attracting—substances.

Additionally, the membrane can be manufactured in the tubing platform of larger pore sizes, allowing for a higher continuous flow rate than previously achievable. This means that the process is both more efficient and faster.

The close partnership between UT and ORNL helped researchers on the project utilize resources in a way that benefits both.

"Being able to do studies like this, to really explore the theoretical and make it practical, goes back to our collaboration," said Hu. "With ORNL, we have the labs, the facilities to really do some amazing things, and with UT we have some research associates who provided assistance to collect the initial data.

"Bamin [Khomami, head of the Department of Chemical and Biomolecular Engineering] is fully engaged in and supportive of that effort and of my nearly 20 years of ORNL-UT collaboration."

The payoffs from such collaborations on the project go far beyond the gas pump.

Any industry involved in separating liquids or vapor mixtures as part of its manufacturing process could see its costs reduced, leading to consumer savings on everything from medicine to plastics.

"Much like with fuel, if you can speed those up and make them more efficient, it could save consumers money," said Hu.

By coming up with their new approach to refining fluids, Hu and his group also caught the eye of R&D Magazine, which named their breakthrough one of their Top 100 ideas of 2014.

Hu is quick to caution that the end benefit could still be years away, however.

"We have a proof of process concept worked out, but there's still plenty of testing to be done," said Hu.

Provided by University of Tennessee at Knoxville

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